Federal Aviation Administration

Memorandum

Date: JUL 31 2006

To: Director, Technical Ops Aviation System Standards, AJW-3

From: AFS-400

Prepared by: Bill Hammett, Flight Procedure Standards Branch, AFS-420

Subject: Notices to Airmen (NOTAMs) to Support Area Navigation (RNAV) Substitution

Effective August 3, 2006, the FAA will allow increased RNAV substitution for other navigation aids throughout the National Airspace System (NAS). The full details of the substitution have been forwarded to the appropriate lines of business via memo and will be published in the August 3 Notices to Airmen Publication until included in the Aeronautical Information Manual (AIM). A copy of the background information is attached.

Implementation of the new substitution policy will also require text changes to NOTAMs affecting instrument flight procedures. Effective August 3, Order 8260.19C, *Flight Procedures and Airspace*, paragraph 224d (5) is revised as follows:

224d (5) Aircraft equipped with RNAV systems may substitute them for inoperative ground NAVAIDs. However, RNAV systems must not be substituted for NAVAIDS providing final approach course lateral guidance on instrument approach procedures.

(a) When the use of an instrument approach procedure, departure procedure (SID or ODP), or standard terminal arrival (STAR) is restricted or prohibited by NOTAM because of a NAVAID (VOR, NDB, compass locator, or DME) outage, the NOTAM does not apply to aircraft equipped with suitable GPS RNAV systems. For clarification, state the reason for the restriction in the text of the procedural NOTAM D or FDC NOTAM.

Examples:

A DME antenna is out of service: "DME MINIMUMS NA EXCEPT FOR AIRCRAFT EQUIPPED WITH SUITABLE RNAV SYSTEM WITH GPS, ORD DME OTS."

An LOM used for procedure entry and/or missed approach clearance limit for an ILS approach is out of service: "PROCEDURE NA EXCEPT FOR AIRCRAFT EQUIPPED WITH SUITABLE RNAV SYSTEM WITH GPS, GR LOM OTS."

A VOR is used in a departure procedure (ODP or SID) is out of service: "GEYSER THREE DEPARTURE NA EXCEPT FOR AIRCRAFT EQUIPPED WITH SUITABLE RNAV SYSTEM WITH GPS, JAC VOR OTS."

(b) In certain circumstances, AFS-400 may determine that the use of RNAV systems that utilize DME/DME/IRU inputs should be allowed. In these instances, insert the phrase "OR DME/DME/IRU" after "SUITABLE RNAV SYSTEM WITH GPS." Include any required DME facilities to support DME/DME/IRU operations.

Example: "HOOVER THREE DEPARTURE NA EXCEPT FOR AIRCRAFT EQUIPPED WITH SUITABLE RNAV SYSTEM WITH GPS OR DME/DME/IRU, PGS VOR OTS. BLD AND DRK MUST BE OPERATIONAL FOR DME/DME/IRU ON PEACH SPRINGS TRANSITION. DRAKE TRANSITION NA FOR DME/DME/IRU."

The National Flight Procedures Group (NFPG) will only apply subparagraph (b) when directed by AFS-400. AFS-400 is responsible for determining the DME/DME/IRU requirements and forwarding the information to the NFPG for inclusion in the NOTAM.

This policy memorandum is cancelled upon publication of Order 8260.19D. If you have any questions, please contact Donald Pate, Manager, AFS-420, at (405) 954-4164.

Enclosure

cc: Notices to Airmen (NOTAMs) Support Group, AJR-46
Operations Manager, US NOTAM Office, AJR-116
National Flight Procedures Group, AJW-32
Quality Oversight and Technical Advisory Team, AJW-321
National Aeronautical Charting Group, AJW-35
Requirements and Technology Team, AJW-352
Aeronautical Information Management Group, AJR 32
National Flight Data Center, AJR-321

Use of Area Navigation (RNAV) Equipment on Conventional Procedures and Routes

BACKGROUND. Since the original allowances for the use of GPS in lieu of ADF and DME were developed and published, a number of questions have arisen regarding different technologies and potential situations for substitution. In response to these inquiries and data gained from operational experience, the Federal Aviation Administration has updated these allowances and incorporated the changes into this notice.

DISCUSSION. This notice sets forth the Federal Aviation Administration (FAA) policy concerning the operational use of RNAV equipment for the following applications within the National Airspace System (NAS):

- As a substitute means of navigation guidance when a VOR, NDB, DME, or compass locator facility is out-of-service (that is, the navaid information is not available); an aircraft is not equipped with conventional equipment such as ADF or DME; or the conventional equipment such as ADF or DME on an aircraft is not operational. For example, if equipped with a suitable RNAV system, a pilot might hold over an out-of-service NDB.

- As an alternate means for navigation guidance when a VOR, NDB, DME, or compass locator facility is operational, such that the pilot can revert to the underlying guidance, as necessary, but does not normally monitor the underlying aid. For example, if equipped with a suitable RNAV system, a pilot might fly a procedure or route based on operational VOR using RNAV equipment but not monitor the VOR.

Two changes from previous guidance on this subject, provided in Section 1-1-19 of the Aeronautical Information Manual, are the allowance for "substitution" of VOR facilities and the use of RNAV systems described in Advisory Circular (AC) 90-100 *U.S. Terminal and En Route Area Navigation (RNAV) Operations*.

ALLOWABLE RNAV EQUIPMENT. Subject to the requirements in this notice, operators may use the following types of RNAV equipment as a substitute or alternate means of navigation guidance:

- An RNAV system with GPS or DME/DME/IRU inputs, installed in accordance with appropriate airworthiness installation requirements, and compliant with the equipment provisions of AC 90-100. Standalone GPS systems, compliant with AC 90-100, are included in this set of equipment. A list of compliant systems is available under "Policies & Guidance" at the following website.

http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs400/afs410/

- An RNAV system with GPS or DME/DME/IRU inputs, lacking the capability to automatically perform course-to-fix legs (also called path terminators), installed in accordance with appropriate airworthiness installation requirements, and otherwise compliant with the equipment provisions of AC 90-100. This subset of equipment includes some standalone GPS systems and flight management systems that are authorized for instrument flight rules (IFR) en

route and terminal operations but not fully compliant with AC 90-100. However, these systems may not be used as a substitute or alternate means of navigation guidance on segments of an instrument approach, departure, or arrival procedure defined by a VOR course. This restriction does not apply to routes, which may be selected by route name or constructed by "stringing" together two or more waypoints from an onboard navigation database. Many of these systems are identified on the aforementioned website.

NOTE- RNAV systems using DME/DME/IRU, without GPS input, may only be used as a substitute means of navigation guidance when authorized by NOTAM for a specific procedure, NAVAID, or fix. The NOTAM authorizing the substitution will identify any required DME facilities based on FAA assessment of the DME navigation infrastructure.

ALLOWABLE OPERATIONS. Subject to the requirements in this notice, operators may use an RNAV system for the following operations:

- Determine aircraft position over a VOR, NDB, compass locator, or DME fix.
- Determine the aircraft position over a named fix defined by a VOR course, NDB bearing, or compass locator bearing crossing a VOR or localizer course.
- Navigate to or from a VOR, NDB, or compass locator. For example, a pilot might proceed direct to a VOR or navigate on a segment of a departure procedure. However, pilots may not substitute for the navigation aid providing lateral guidance for the final approach segment. This restriction does not refer to instrument approach procedures with "or GPS" in the title when using GPS or WAAS.
- Hold over a VOR, NDB, compass locator, or DME fix.
- Fly a DME arc.

These allowances do not include navigation on localizer-based courses (including localizer back-course guidance).

***NOTE 1-** No approval is required for these operations except for operators operating under 14 CFR Part 91 Subpart K, 121, 125, 129, and 135.*

***NOTE 2-** These allowances apply only to operations conducted within the NAS.*

***NOTE 3-** The allowances defined in this notice apply even when a facility is explicitly identified as required on a procedure (for example, "Note ADF required"). These allowances do not apply to procedures that are identified as not authorized (NA) without exception by a NOTAM, as other conditions may still exist and result in a procedure not being available.*

***NOTE 4-** ADF equipment need not be installed and operational, although operators of aircraft without an ADF will be bound by the operational requirements defined in this notice and not have access to some procedures.*

***NOTE 5-** For the purpose of this notice, "VOR" includes VOR, VOR/DME, and VORTAC facilities.*

***NOTE 6-** Heading-based legs associated with procedures may be flown using manual technique (based on indicated magnetic heading) or, if available, extracted from the aircraft database and flown using RNAV system guidance.*

GENERAL OPERATIONAL REQUIREMENTS:

- Pilots may not use their RNAV system as a substitute or alternate means of navigation guidance if their aircraft has an AFM or AFM supplement with a limitation to monitor the underlying navigation aids for the associated operation.

- Pilots of aircraft with an AFM limitation that requires the aircraft to have other equipment appropriate to the route to be flown may only use their RNAV equipment as a substitute means of navigation in the contiguous U.S. In addition, pilots of these aircraft may not use their RNAV equipment as a substitute for inoperable or not-installed equipment.

- Pilots must comply with the guidelines contained in their AFM, AFM supplement, operating manual, or pilot's guide when operating their aircraft navigation system.

- Pilots must ensure their onboard navigation data is current, appropriate for the region of intended operation, and includes the navigation aids, waypoints, and relevant coded terminal airspace procedures for the departure, arrival, and alternate airfields.

NOTE- *The navigation database should be current for the duration of the flight. If the AIRAC cycle will change during flight, operators and pilots should establish procedures to ensure the accuracy of navigation data, including suitability of navigation facilities used to define the routes and procedures for flight. Traditionally, this has been accomplished by verifying electronic data against paper products. One acceptable means is to compare aeronautical charts (new and old) to verify navigation fixes prior to departure. If an amended chart is published for the procedure, the operator must not use the database to conduct the operation.*

- Pilots must extract procedures, waypoints, navaids, or fixes by name from the onboard navigation database and comply with the charted procedure or route.

- For the purposes described in this notice, pilots may not manually enter published procedure or route waypoints via latitude/longitude, place/bearing, or place/bearing/distance into the aircraft system.

OPERATIONAL REQUIREMENTS FOR DEPARTURE AND ARRIVAL PROCEDURES:

- Pilots of aircraft with standalone GPS receivers must ensure that CDI sensitivity is ±1 NM.

- In order to use a substitute means of navigation guidance on departure procedures, pilots of aircraft with RNAV systems using DME/DME/IRU, without GPS input, must ensure their aircraft navigation system position is confirmed, within 1,000 feet, at the start point of take-off roll. The use of an automatic or manual runway update is an acceptable means of compliance with this requirement. A navigation map may also be used to confirm aircraft position, if pilot procedures and display resolution allow for compliance with the 1,000-foot tolerance requirement.

OPERATIONAL REQUIREMENTS FOR INSTRUMENT APPROACH PROCEDURES:

- When the use of RNAV equipment using GPS input is planned as a substitute means of navigation guidance for part of an instrument approach procedure at a destination airport, any required alternate airport must have an available instrument approach procedure that does not require the use of GPS. This restriction includes conducting a conventional approach at the alternate airport using a substitute means of navigation guidance based upon the use of GPS. This restriction does not apply to RNAV systems using WAAS as an input.

- Pilots of aircraft with standalone GPS receivers must ensure that CDI sensitivity is ±1 NM.

***NOTE** - If using GPS distance as an alternate or substitute means of navigation guidance for DME distance on an instrument approach procedure, pilots must select a named waypoint from the onboard navigation database that is associated with the subject DME facility. Pilots should not rely on information from an RNAV instrument approach procedure, as distances on RNAV approaches may not match the distance to the facility.*

OPERATIONAL REQUIREMENTS FOR SPECIFIC INPUTS TO RNAV SYSTEMS:

GPS-

o RNAV systems using GPS input may be used as an alternate means of navigation guidance without restriction if appropriate RAIM is available.

o Operators of aircraft with RNAV systems that use GPS input but do not automatically alert the pilot of a loss of GPS, must develop procedures to verify correct GPS operation.

o RNAV systems using GPS input may be used as a substitute means of navigation guidance provided RAIM availability for the operation is confirmed. During flight planning, the operator should confirm the availability of RAIM with the latest GPS NOTAMs. If no GPS satellites are scheduled to be out-of-service, then the aircraft can depart without further action. However, if any GPS satellites are scheduled to be out-of-service, then the operator must confirm the availability of GPS integrity (RAIM) for the intended operation. In the event of a predicted, continuous loss of RAIM of more than five (5) minutes for any part of the route or procedure, the operator should delay, cancel, or re-route the flight as appropriate. Use of GPS as a substitute is not authorized when the RAIM capability of the GPS equipment is lost.

***NOTE**- The FAA is developing a RAIM prediction service for general use. Until this capability is operational, a RAIM prediction does not need to be done for a departure or arrival procedure with an associated "RADAR REQUIRED" note charted or for routes where the operator expects to be in radar coverage. Operators may check RAIM availability for departure or arrival procedures at any given airport by checking approach RAIM for that location. This information is available upon request from a U.S. Flight Service Station, but is no longer available through DUATS.*

WAAS-

o RNAV systems using WAAS input may be used as an alternate means of navigation guidance without restriction.

o RNAV systems using WAAS input may be used as a substitute means of navigation guidance provided WAAS availability for the operation is confirmed. Operators must check WAAS NOTAMs.

DME/DME/IRU-

o RNAV systems using DME/DME/IRU, without GPS input, may be used as an alternate means of navigation guidance whenever valid DME/DME position updating is available.